# Consulting Assistance on Economic Reform II

# Discussion Papers

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## Macroeconomic Impacts of Social Safety Nets

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**CAER II**
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# Macroeconomic Impacts of Social Safety Nets*


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**Executive Summary**

The objective of this research was to examine the possible macroeconomic impacts of establishing a social safety net in a developing country. Nicaragua was used as a case study, although the findings should be applicable in many, if not most, developing countries.

Social safety nets are quick assistance mechanisms designed to alleviate extreme poverty in developing countries. By targeting the extreme poor, social safety nets help avoid the massive distortions traditionally associated with untargeted input or output subsidies. The difference between subsidies that can be captured by the entire population, and subsidies that can be targeted to the deserving population can be very large: untargeted assistance to the extreme poor through subsidies that can be captured by the less poor or the non-poor may result in programs that may be fiscally unsustainable, or programs that can induce a reduction in labor supply. Hence, before implementing a specific social safety net it is advisable to determine its possible impacts on fiscal and human resources before such impacts become a problem. First of all, how fiscally sustainable is the social safety net? Second, what would be the impact of a safety net on tax revenues? In countries with a sales tax and a weak personal income tax, the impact of a safety net on income distribution can be large or insignificant depending on its interaction with tax policy. Third, what would be the impact of the income transfer from a social safety net on the labor supply of the poor? The findings of this research are summarized as follows:

*Are social safety nets fiscally sustainable?* The results indicate that the sustainability of a social safety net depends in large part on the rationalization of existing poverty alleviation programs, some of which could be targeted better, and some of which could be reformulated to make them more oriented toward the extreme poor. Nicaragua would need to disburse about US$50 million per year to raise the income of the extremely poor to the extreme poverty line. Most of this expenditure could be obtained from a better use of the existing poverty alleviation funds. However, there would be a significant impact on the public sector deficit. If 25 percent of the current poverty alleviation portfolio was reallocated to the type of transfer programs being piloted by the social safety net, then the deficit would increase from $235 million to $278 million. If 50 percent of the current poverty alleviation portfolio was reallocated to the social safety net, then the deficit would increase from $235 million to $264 million. Under the latter assumption, the deficit would increase from 28 percent of the national budget to 30 percent—a modest increase of two percentage points.

*Are social safety nets complementary to tax policy in improving the distribution of incomes?* The results indicate that to cover the cost of a safety net that would close the expenditure gap of the *extremely* poor (approximately 150,000 households, which translate into 830,000 people) the government would have to increase tax *revenues* from petroleum taxes and the value added tax by 5 percent. This revenue increase may or may not require an increase in the tax rate, since improved collection may be enough. Other tax sources are too small to make an impact, or have already undergone significant modifications.

*Are social safety nets good for economic growth?* It has been argued that the income transfers from a social safety net may yield a net disincentive to work among those living in poor households. The results indicate that the size of the disincentive is very small, not exceeding four days per year. Moreover, most of the reduction would accrue to child labor, which is one of the key social objectives of the social safety net, and which is socially desirable for the accumulation of human capital among the poor.

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## I. Introduction

Social safety nets are formal government institutions and mechanisms designed to help poor people avoid hunger, malnutrition, and disease on a short run basis. In the long run, safety nets help poor families improve their chances of survival and set the base for human capital accumulation among the poor. Programs such as food stamps, workfare, emergency transfer payments, and monetary or in-kind aid to specific vulnerable groups are a few of the many ways in which society assists those most in need.

Because safety nets imply a net transfer of income from one sector of society to another through government action, they have fiscal and structural impacts. Fiscally, social safety nets affect the composition of the national budget and the level of fiscal balances. Also, social safety nets may affect the tax structure since governments have to come up with the required revenues to fund them. Finally, safety nets—by virtue of their income transfer to poor households—may affect the net incentives of recipients to engage in paid work, thus affecting economic growth. All these effects may create political and fiscal problems for a government.

As part of the restructuring of government in developing countries, social safety nets have become a very important component of social sector policy. Social safety nets in developing countries are being implemented with the specific aim of protecting the most vulnerable groups in society—generally the extreme poor—from the negative impacts coming from the reduction of government social services and the elimination of untargeted subsidies.

The objective of this paper is to examine some key macroeconomic impacts resulting from the establishment and long-term maintenance of social safety nets in developing countries. The result of this analysis would help developing countries in designing their social safety nets. In particular, this paper addresses three key questions:

a. *Are social safety nets fiscally sustainable?* The extent to which social safety nets can be funded with national funds before requiring external assistance is important for determining their size and scope.
b. *Are social safety nets complementary to tax policy in improving the distribution of incomes?* A review of this issue would help in determining the complementarity between the incidence of taxes and the redistribution effects of the income transfer implicit in a social safety net.
c. *Are social safety nets good for economic growth? A priori*, social safety nets help the poor obtain minimum nutritional requirements and improve their access to health and educational services, increasing their labor productivity and human capital. However, in the short run social safety nets may result in a disincentive to work due to the income and substitution effects inherent in any income transfer.

Section II of this paper briefly reviews the concept of social safety nets in developing countries and examines the issue of targeting, which is crucial for determining the size and scope of a social safety net. Section III examines the fiscal and tax impacts of social safety nets in Nicaragua, where a pilot income-transfer program is now in place, and where several other programs designed to assist the poor are already functioning. Section IV examines the impact of social safety nets on labor supply among the poor, using data from Nicaragua's 1998 Living Standards Measurement Survey. Section V lists main conclusions and recommendations.

## II. What Is a Social Safety Net, Anyway?

Social safety nets are programs designed to protect the poor from economic downturns, reductions in public services, and the negative effects of natural disasters. These programs provide income or services that protect the poor from hunger, malnutrition, child labor, and loss of human capital. Social safety nets may take different forms, including:

i. Workfare (emergency employment programs or food-for-work programs).
ii. Tied subsidies (programs that condition assistance to school attendance and/or participation in health programs by the household's school-aged children).
iii. Child development programs, including school feeding programs, and child health programs.
iv. Targeted assistance to vulnerable low-income groups, such as retirees, the elderly, the handicapped, and pregnant and lactating women.

Social safety nets in developing countries were formalized as a result of the macroeconomic shocks of the 1980s, during which reductions in labor demand, inflation, and the contraction in the size of the public sector resulted in dramatic declines in the welfare levels of the poor.[1] Macroeconomic shocks affected poor people through declines in real wages, increases in open unemployment, and household disruptions due to an increase in child labor and the stagnation of the level of human capital of poor households. In the absence of formal mechanisms for assisting the poor during the periods of weak labor demand, families cope in different forms,[2] not all of them socially optimal, such as increasing hours of work beyond full-time hours, incorporating children into the labor force, and reducing household expenses that include preventive health care and basic education. Under these conditions a sound social sector policy should ensure that fiscal adjustments protect those public services that are very important to the welfare and the human capital of the poor, and that a social safety protect poor people from hunger and destitution.

The main concern about social safety nets is their financial sustainability since, by definition, social safety nets imply a net income transfer from the government to the poor. Clearly, financial sustainability depends on the size of the transfer, the magnitude of service coverage, and the operational efficiency of the transfer mechanism. Relatedly, the operational characteristics of the social safety net also affect its sustainability in terms of political support, since the people not receiving benefits want a net that is effective (with minimum benefit leakage to the nonpoor), and amenable to local and national accountability.[3]

A second important concern related to social safety nets is the incentive structure inherent in the transfer system. Specifically, an income transfer may result in a reduction in the labor supply of the poor. If that reduction in labor supply comes from children, then the transfer achieves a positive social objective. However, if the transfer reduces the labor supply of the working-age poor, then the transfer may have an

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[1] Francisco Ferreira, Giovanna Prennushi, and Martin Ravallion, "Macroeconomic Crises and Poverty: Transmission Mechanism and Policy Responses," mimeo (Washington, D.C.: Development Research Group, World Bank, 1999).

[2] Examples of coping strategies can be found in the World Bank, 2000, "Nicaragua Poverty Assessment. Challenges and Opportunities for Poverty Reduction, Volume I: Main Report," Report No. 20488 NI (Washington, D.C.: Poverty Reduction and Economic Management Sector Unit, Latin America and the Caribbean Region).

[3] Jeni Klugman, "Social Safety Nets and Crises," mimeo, Employment and Poverty Program (Washington, D.C.: World Bank).

undesirable effect on national production and erode the political support of the middle class, in which case it would confirm their long-held perceptions of the poor as lazy or unmotivated. These concerns are usually addressed through careful program targeting, which tries to minimize the number of undeserving beneficiaries (also called *leakage*) and keep the exclusion of deserving beneficiaries at a minimum.

Leakage can be costly. Previous calculations for Nicaragua indicate that in the absence of a poverty map used for targeting depressed areas, fully 40 percent of the benefits would go to the nonpoor.[4] As a result, social safety nets frequently implement policies that help induce self-targeting, such as:

- the provision of workfare at below minimum wage,
- the provision of subsidies for goods consumed mostly by the poor, and
- the provision of services in geographically depressed areas.

Other strategies for reducing leakage require large amounts of information on family income and wealth in order to identify poor households and minimize the exclusion of poor people. The use of screening mechanisms at the household level—such as those used in Chile and Colombia—increase program cost, but do not necessarily improve effectiveness.[5] In fact, the empirical evidence indicates that there are successes and failures at low and high levels of household information. In the case of Nicaragua, which is the country selected for this analysis, the government generally uses geographical targeting for benefit delivery, which can be a very effective means for program targeting under certain circumstances.[6]

### A. Social Safety Nets: The Case of Nicaragua

According to the 1998 survey on living standards, 17.3 percent of Nicaragua's population—approximately 830,000 people—lives in extreme poverty. People in extreme poverty spend less than the amount necessary to buy enough food.[7] The extreme poor in Nicaragua have annual expenditures per capita lower than $212. On average, their per capita expenditures would have to increase 4.8 percent to reach the extreme poverty line. Under perfect targeting the total poverty gap is US$353 million annually, which represents almost one-fifth of GDP and close to one-half of total public spending. For extreme poverty, the total dollar amount is US$49 million annually, which is a substantially smaller amount than total foreign aid coming into Nicaragua. However, this figure represents perfect transfers to the extreme poor with no administrative costs[8].

The social safety net for Nicaragua—now in its pilot phase—gives participating families a cash transfer conditional on the preschool and primary school attendance of children, and on continuous participation of the family in maternal and child health programs. Modeled after the PROGRESA program in Mexico, the program in Nicaragua assists households in extreme poverty with a cash transfer aimed at narrowing the gap between poverty and extreme poverty. People in extreme poverty cannot afford food, while people in poverty can. The program is considered a safety net because it helps families obtain a minimum

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[4] Gustavo Arcia, Héctor Mendoza, and Ronaldo Iachan, Mapa de Pobreza Municipal de Nicaragua (North Carolina: Center for International Development, Research Triangle Institute, Research Triangle Park,1999).

[5] Klugman, op. cit.

[6] Jyotsna Jalan and Martin Ravallion, "Spatial Poverty Traps?" Policy Research Working Paper 1862 (Washington, D.C.: Development Research Group, the World Bank, 1997); Martin Ravallion and Quentin Woodon, "Poor Areas or Only Poor People?" Policy Research Working Paper 1798 (Washington, D.C.: Development Research Group, the World Bank, 1997).

[7] The World Bank, 2000, op. cit.

[8] The total amount needed to close the poverty gap is calculated by adding the gaps of all poor/extremely poor households. As a result, the total gap is substantially different from the product of multiplying 4.8% of the extreme poverty line by the number of extremely poor people. Source: The World Bank, 2000. *op. cit*. Ch. II.

level of nutrition. Targeting of beneficiaries during the pilot phase is geographical; benefits are given to all families residing in six municipalities classified as extremely poor in Nicaragua's poverty map, but with adequate access to education and basic health services. Once the pilot phase is concluded, the program will expand into other areas. To minimize leakage, future beneficiaries will be identified with the help of proxy variables that correlate very closely with extreme poverty. The amount of benefits per family (Table 1) will vary depending of the presence of school-age children in the household, and on the participation in health and education programs oriented to parent participation in community development, prevention programs, and participation in school affairs.

**Table 1. Safety Net Benefits, Nicaragua Pilot Project**

| Benefit | Value |
|---|---|
| School Pack (notebooks, materials, uniforms) | US $21/school child/year, grades 1–3 |
| School Voucher (max. 2 per household) | US $112/school child/year, grades 1–3 |
| Voucher for Autonomous Schools | US $5/school child/year, grades 1–3 |
| Health, Education, and Health Training vouchers | US $14/household/year |
| Nutrition Assistance | US $242/household/year |
| Maternal and Child Health Voucher | US $40/household/year |

Source: Inter-American Development Bank, project appraisal, Nicaragua Social Safety Net, 2000

Given the above schedule, a participating household with no school-age children would receive a minimum amount of $242 as nutritional assistance. A household that qualifies for all the benefits above could receive up to $572 per year (households must limit the number of participating children to two). Since rural households in extreme poverty have an average of 7.7 members, then the increase in per capita income brought in by the safety net could range between $31 and $74 per year under the minimum and maximum scenarios. In fact, the minimum scenario would push up the income of the average extreme poor by about 14 percent, which is higher than the average 4.8 percent gap for extreme poverty.

## III. The Fiscal Impact of Nicaragua's Social Safety Net

Since 1990 the government has implemented several programs and projects ostensibly targeted to the poor.[9] Some could be loosely considered as components of a safety net, while others could become part of a safety net after some modifications. These projects and programs are loosely targeted to the poor. In some cases, the geographical targeting of some municipalities seems to be adequate enough, while in other cases there is no targeting at all. Their implementation underscores the lack of focus that existed in Nicaragua's social policy prior to the establishment of the social safety net pilot. As far as program implementation is concerned, poverty is fairly uniform, not taking into account the differences in need between the extreme poor and the rest of the poor. The only exception to this approach is the Investment Fund for Social Emergency (FISE), which pioneered the use of a poverty map in its resource allocation, and which monitors resource allocation by type of poverty.

The list of projects in Table 2 shows a portfolio of approximately $50 million, of which domestic funding exceeds $13 million. Current domestic funding for poverty alleviation equals 26 percent of the $49 million needed for filling the extreme poverty gap at the national level. Evidently, these figures do not include the overhead cost implicit in the transfer, nor the funds lost to leakage and operational inefficiencies that inevitably arise in this type of program. However, they suggest that setting up a social safety net by reorganizing some—if not all—of the existing programs could position the government within striking distance of setting up a proper safety net at the national level.

[9] All figures from the Ministry of Finance are expressed in U.S. dollars for ease of exposition. Exchange rate: C$12.5 = US$1.

**Table 2. Current Government Programs Assisting the Poor**

| Institution and Project | Domestic Funds '000 US$ | External Donors '000 US$ | External Loans '000 US$ | Total '000 USD |
|---|---|---|---|---|
| **Ministry of Agriculture and Forestry** | | | | |
| Food Security for Low-Income Rural Families | 410 | 2,130 | | 2,540 |
| Assistance to Affected Families, Hurricane Mitch | 715 | 3,513 | | 4,228 |
| Assistance to Small Low Income Farmers—INTA | 136 | 394 | | 530 |
| Food Security/Peace Corp/INTA | 28 | 210 | | 238 |
| **Office of the Presidency** | | | | |
| Integrated Basic Services Program (PROSERBI) | 421 | 985 | | 1,406 |
| Repair of Damaged Housing-Hurricane Mitch | 2,508 | | | 2,508 |
| Community Employment Program | 1,069 | 2,075 | | 3,144 |
| Emergency Social Fund | | 2,540 | | 2,540 |
| **Ministry of Education** | | | | |
| Assistance to Preschool Children in Poor Areas | | 2,944 | | 2,944 |
| **Ministry of the Family** | | | | |
| Safe Homes for the Elderly and Orphans—FISE | 80 | 117 | 535 | 731 |
| Family Vegetable Gardens—FISE | 151 | 222 | 1,016 | 1,389 |
| Social Projects—FISE | 78 | 115 | 526 | 719 |
| **Institute for Municipal Development (INIFOM)** | | | | |
| Development of Rural Municipalities (PROTIERRA) | 579 | | 8,139 | 8,718 |
| **Institute for Rural Development (IDR)** | | | | |
| Reactivation of Food Production (PNDR II) | 1,120 | | 5,600 | 6,720 |
| Integrated Rural Development of Poor Communities in Leon and Chinandega | 202 | 861 | | 1,064 |
| Socioeconomic Development—North and Central Zones | 40 | 400 | | 440 |
| Socioeconomic Development—Waslala, Cua Bocay, Tuma La Dalia, Rancho Grande | 40 | 400 | | 440 |
| **Institute for Urban and Rural Housing** | **5,600** | **4,583** | | **10,183** |
| **Total** | **13,179** | **21,488** | **15,816** | **50,483** |

Source: Ministry of Finance, national budget for 2000.

Most of the poverty programs listed above target geographical areas considered predominantly poor by the government. However, there is no uniform criterion for selecting an area for assistance. Some areas are chosen because of political considerations, others because they are considered to be prioritary by the ministry in charge of the program, other areas because of previous involvement by bilateral donors, and others because they are listed in FISE's poverty map. Although geographical targeting is not necessarily inefficient—that is, it does not necessarily leak large amounts of benefits to undeserving households—all the programs above do not target the poor very well since they lack a method for monitoring household selection or the proper allocation of project benefits to the intended beneficiaries (Table 3).

Even though some leakage is inevitable—as Klugman indicates, information-intensive programs do not necessarily increase the allocative efficiency of their resources[10]—the mere existence of many overlapping programs suggests that some consolidation and coordination is in order, perhaps under the

[10] Klugman, op. cit.

umbrella of the social safety net currently being piloted. As it currently stands, the proliferation of poverty alleviation projects with soft targeting criteria generates a project portfolio that tends to use more administrative overhead than it should. This is an issue that will be addressed in the next section.

**Table 3. Targeting Characteristics of Current Poverty Alleviation Programs**

| Institution and Project | Targets predominantly poor areas | Targets the extreme poor ad-hoc or through self-selection | Provides food assistance | Provides non-food assistance |
|---|---|---|---|---|
| **Ministry of Agriculture and Forestry** | | | | |
| Food Security for Low Income Rural Families | | | | |
| Assistance to Affected Families, Hurricane Mitch | | | | |
| Assistance to Small Low Income Farmers—INTA | | | | |
| Food Security/Peace Corp/INTA | | | | |
| **Office of the Presidency** | | | | |
| Integrated Basic Services Program (PROSERBI) | | | | |
| Repair of Damaged Housing—Hurricane Mitch | | | | |
| Community Employment Program | | | | |
| Emergency Social Fund | | | | |
| **Ministry of Education** | | | | |
| Assistance to Preschool Children in Poor Areas | | | | |
| **Ministry of the Family** | | | | |
| Safe Homes for the Elderly and Orphans—FISE | | | | |
| Family Vegetable Gardens—FISE | | | | |
| Social Projects—FISE | | | | |
| **Institute for Municipal Development (INIFOM)** | | | | |
| Development of Rural Municipalities (PROTIERRA) | | | | |
| **Institute for Rural Development (IDR)** | | | | |
| Reactivation of Food Production (PNDR II) | | | | |
| Integrated Rural Development of Poor Communities in Leon and Chinandega | | | | |
| Socioeconomic Development—North and Central Zones | | | | |
| Socioeconomic Development—Waslala, Cua Bocay, Tuma La Dalia, Rancho Grande | | | | |
| **Institute for Urban and Rural Housing** | | | | |

Source: Assessed by the author.

A final concern regarding the programs in the current portfolio is their relationship to the social policy goals of the government, which include attending to the extreme poor (implying the use of screening criteria for beneficiary households) and improving the human capital of the poor. Some of the above programs, although oriented to alleviate poverty, fail in addressing one or both of these policy goals.

### A. The Fiscal Impact of the Social Safety Net

*1. Filling Up the Extreme Poverty Gap*. If the government could implement a social safety net based on income transfers to the extreme poor at the national level, what would be the impact on the national

budget? To answer this question one can use the government's budget for the year 2000 as a base for the calculations. The projected fiscal deficit for 2000 is approximately $235 million, or 10.2 percent of a projected GDP of $2.3 billion (Table 4).[11] This deficit will be financed with external grants and loans of approximately $255 million, of which—according to the Ministry of Finance—about 45 percent will come from external grants and the remaining 55 percent from external loans.

**Table 4. Government Revenues and Expenditures by Source, 2000 ('000 USD)**

| Source | Total | % of Govt. Expenditures | % of Projected GDP |
|---|---|---|---|
| **I. Government Revenues** | 599,240 | **71.8** | **32.6** |
| **Tax Revenues** | 551,454 | 66.1 | 30.0 |
| **Nontax Revenues** | 45,538 | 5.4 | 2.4 |
| **Capital Income** | 2,248 | 0.3 | 0.1 |
| **II. Government Expenditures** | 834,734 | **100** | **38.2** |
| **III. Budget Deficit (I – II)** | (235,494) | **(28.2)** | **(5.6)** |

Source: Ministry of Finance, national budget for 2000 converted at an exchange rate of C$12.5 per US$1.

The government has implemented a deficit reduction plan that mobilizes domestic and external resources to sectors considered to be prioritary, and improves the sustainability of public finances. To these ends the government plans to reduce the public sector deficit (*before grants*) from 13.6 percent of GDP in 1999 to 10.2 percent of GDP in 2000. *After grants*, the deficit for 2000 will be 5.6 percent of GDP. This deficit reduction will be accomplished by increasing the tax on liquor, cigarettes, and soft drinks; by reducing the fiscal burden of some of the government's autonomous enterprises; by privatizing the telephone company; by reducing further the number of government employees; and by rationalizing public investment. As a result, in 2001 the public sector deficit *before grants* is expected to reach 8.2 percent of GDP, and 2 percent of GDP *after grants*.

For purposes of analysis, the net effect of the government's deficit reduction program will be kept constant in order to evaluate the impact of the social safety net in isolation. Since the government already has several untargeted programs for poverty assistance, the first issue that it has to tackle is to review its existing poverty portfolio, and consolidate it under a targeted umbrella, which would help:

- *set priorities* with respect to the intended beneficiaries and define the amounts to be transferred to the extreme poor and the rest of the poor in a manner consistent with the social policy goals of poverty alleviation and human capital investment;
- review the *adequacy of the assistance* programs to the welfare of the extreme poor, especially in the areas of food and nutrition;
- modify existing programs to *increase the efficiency of targeting*, while recognizing that in high-poverty countries there is a tendency for the less poor to resent increased attention to the extreme poor—which may mean that some programs for the rest of the poor may have to be maintained and that information about program targeting and goals must be shared with the rest of the population to gather political support; and
- reapportion domestic funds currently allocated to existing untargeted programs once these programs are reviewed.

In other words, before implementing a new safety net the government should review its current resource allocation and reapportion a significant part of the funding to a targeted safety net. Assuming a 15 percent overhead rate for administering the safety net transfers, and if the government were to borrow the entire

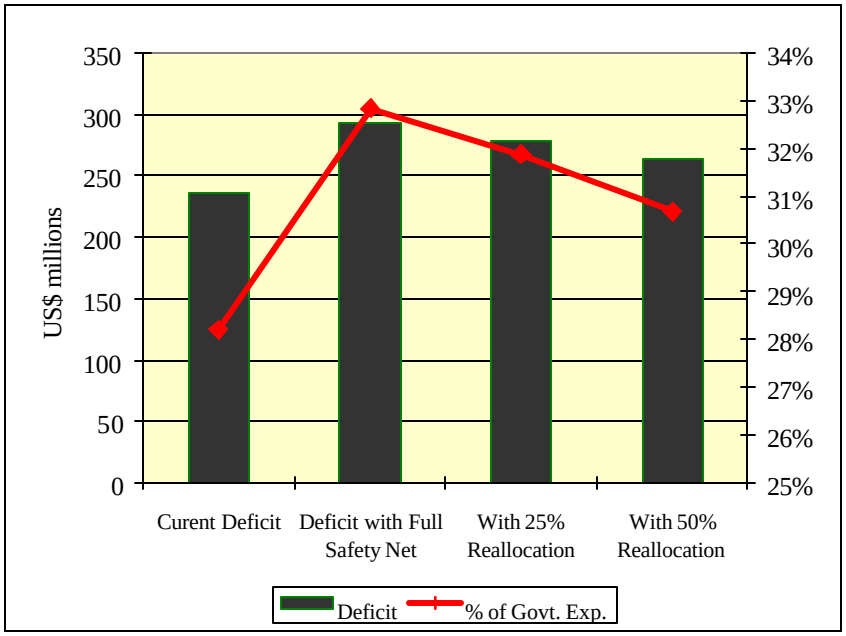
[11] Ministry of Finance projection, August 1999.

amount for its new safety net, then government expenditures would increase by 5.9 percent and *the deficit would increase from 28.2 percent to 32.3 percent* of total expenditures (Figure 1). Government expenditures would have to increase from $834 million to $892 million, and the deficit would increase from $235 million to $293 million.

**Figure 1. Budget Deficit with and without a Social Safety Net, 2000**


If the government were to rationalize its current portfolio of poverty alleviation programs, then the fiscal deficit would be lower, depending on the relative reallocation of resources (Figure 2).

**Figure 2. Effect on the Deficit Resulting from Reallocation of Resources**




Thus, assuming that 25 percent of the current poverty alleviation portfolio was reallocated to the type of transfer programs being piloted by the social safety net, then the deficit would increase to $278 million. If 50 percent of the current poverty alleviation portfolio was reallocated to the net, then the deficit would

increase from $235 million to $264 million. Under the latter assumption, the deficit would increase from 28 percent of the budget to 30 percent—or a modest increase of two percentage points.

### B. Can Nicaragua Afford Its Social Safety Net?

Donor fatigue is a danger faced by many poor countries and Nicaragua is not an exception. In the end, donors want assisted countries to become viable, self-reliant economies. In particular, donors want countries to be able to afford their social investments and to reduce their long-term dependency. This means that current social expenditures should be—in general—financed with taxes and not with grants or loans, since these are intended for capital investment assistance. Even though social assistance can be considered as an investment in human capital, there is a point where such an investment should mature and produce results, which would in turn reduce the poor country's dependency on foreign assistance.

Table 5 shows the planned revenues and expenditures of Nicaragua for 2000.[12] The government receives $551 million in tax revenues, which represents 92 percent of total revenues. Thus, taxes are key for the sustainability of a social safety net. In 1997 the government passed new tax legislation that reduced the limit in the income tax rate from 30 percent to 25 percent, and increased the base income exemption from 25,000 to 50,000 *córdobas* (from approx. $2,000 to $4,000). In addition, the Government increased the tax on liquor, cigarettes, and soft drinks, and reduced import tariffs to an average of 10 percent. These changes were expected to improve investment and economic growth, resulting in increased tax revenues. Although the government would like to increase the value added tax rate to 15 percent, it has not decided on it yet.

The main sources of tax revenues are the value added tax (also known as IGV, the Spanish initials of *Impuesto General de Ventas*), with 22.8 percent of the revenues, and the tax on petroleum products, which account for almost 23 percent of tax revenues. Because of a skewed distribution of income—which leaves a large proportion of the population below the $2,000 level of tax exemption—and low capacity to collect taxes outside of the main cities, income tax revenues represent only 15 percent of total tax revenues. Value added taxes and taxes on petroleum represent 61 percent of all tax revenues. This means that a small increase in the collection of tax revenues from these sources would have a significant impact on public finances.

From Table 5 one can deduce the potential impact of changes in tax policy, all other things being equal. Of course, simulating the effect of taxes is a simultaneous equations problem, in which taxes affect GDP and GDP affects taxes. However, such a model is out of the scope of this paper. The objective here is to give an approximation of the size of the *revenue increase* from taxes that would be necessary to finance a social safety net. The government has indicated that in addition to tax reform, it is counting on increased growth and increased productivity to enlarge the revenue base without increasing the tax rates.

[12] These figures do not reflect the potential fiscal impact of a condonation of Nicaragua's external debt through the Highly Indebted Poor Countries (HIPC) initiative. Currently, the government spends about 8 percent of the budget on debt payments. If Nicaragua becomes eligible to the HIPC, then it must increase debt payment to 10 percent of its budget. Although there are significant fiscal benefits from the HIPC—after all, the external debt would be reduced from $6 billion to about $600 million—the impact will not be felt in the short run (two to three years).

| **Table 5. Government Revenues and Expenditures by Source, 2000 (in '000 USD)** | | | | |
|---|---|---|---|---|
| **Source** | **Revenue Sources** | **Tax Revenue Subtotal** | **Total** | **% of Tax Revenues** |
| **I. Government Revenues** | | | **599,240** | |
| **Tax Revenues** | | | **551,454** | 100.00% |
| *Income Tax* | | *86,701* | | 15.72% |
| *Tax on Consumption, Production, and Internal Transactions* | | *285,791* | | |
| Value Added Tax (IGV) | 125,865 | | | 22.82% |
| Specific Consumption Taxes (IEC) | 159,145 | | | |
| Rum and Spirits | 6,653 | | | 1.21% |
| Beer | 16,640 | | | 3.02% |
| Soft Drinks | 8,313 | | | 1.51% |
| Petroleum and Its Derivatives | 126,640 | | | 22.96% |
| Other Consumption Taxes | 899 | | | 0.16% |
| Fiscal Fees (ITF) | 782 | | | 0.14% |
| *Taxes on External Trade* | | *178,962* | | |
| Import Tariffs (DAI) | 40,060 | | | 7.26% |
| Temporary Protection Tariff (ATP) | 9,186 | | | 1.67% |
| General Tax on the Value of Imports | 119,174 | | | 21.61% |
| Specific Consumption Taxes on Imports | 10,542 | | | 1.91% |
| **Non Tax Revenues** | | | **45,538** | |
| **Capital Income** | | | **2,248** | |
| | | | | |
| **II. Government Expenditures** | | | **834,734** | |
| *Current Expenditures* | | *463,027* | | |
| *Capital Expenditures* | | *371,708* | | |
| | | | | |
| **III. Budget Deficit (I – II)** | | | **(235,494)** | |
| *External Grants* | | *106,973* | | |
| *External Loans* | | *149,046* | | |
| *Net Internal Financing* | | *(20,525)* | | |

Source: Ministry of Finance, national budget for 2000 converted at an exchange rate of C$12.5 per US$1.

Moreover, since income taxes and taxes on liquor, cigarettes, and soft drinks have already been adjusted in 1999, it is politically more feasible to increase revenues from petroleum taxes products and the IGV, as shown in Table 6.

| **Table 6. Impact of Increased IGV and Petroleum Tax Revenues and Reduction in Total Government Expenditures ('000 USD)** | | |
|---|---|---|
| **Increase in IGV and Petroleum Tax Revenues** | **Reduction in Total Expenditures** | |
| | **5%** | **10%** |
| 5% | -181,132 | -145,727 |
| 10% | -168,506 | -126,770 |
| | *Amount of liberated funds* | |
| 5% | 54,362 | 89,767 |
| 10% | 66,988 | 108,724 |

Furthermore, increasing the tax rate on cigarettes, hard liquor and beer—because they have a low price elasticity of demand—would have less of an impact on fiscal revenues because they represent less than 6 percent of all tax revenues. The results indicate that a net reduction of 5 percent in total government expenditures, combined with a 5 percent increase in the tax *revenues* from petroleum and IGV would liberate enough funds to pay for the income transfer implicit in the social safety net for the extreme poor. It must be noted that the increase in tax revenues may come from an increased effectiveness in tax collection under current tax rates, an increase in the tax rate (which could produce lower rates of production growth) or a combination of both.

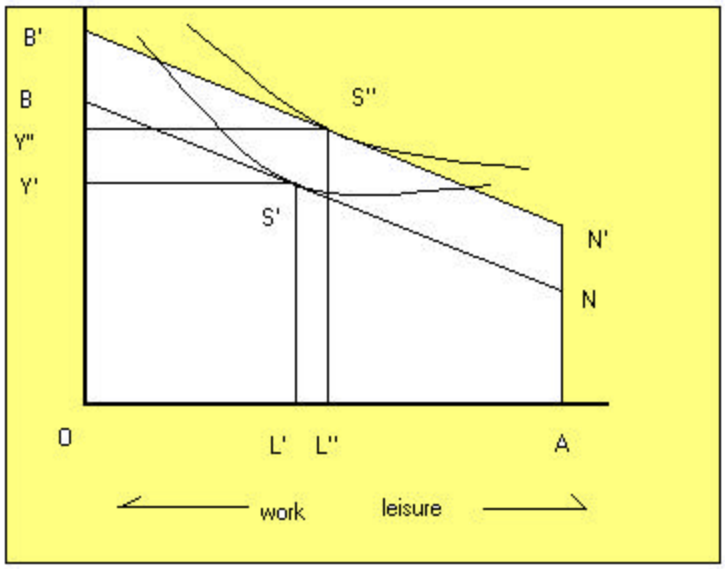
In summary, Nicaragua can have a sustainable social safety net—*within its current macroeconomic program*—if it is able to:

- Improve the targeting of its current portfolio of poverty alleviation programs
- Reduce total expenditures by no more than 5 percent
- Increase tax revenues from IGV and petroleum by no more than 5 percent
- Maintain an adequate stream of grants and loans under its current deficit management plan.

## IV. Impact of Safety Net Transfers on the Labor Supply of the Poor

Because Nicaragua's social safety net involves the transfer of income to working adults and children, there is a possibility for a net reduction in the labor supply of the poor, which could counter one of the main objectives of the government's poverty policy—to increase agricultural production to increase the incomes of the poor. The impact of an income transfer on labor supply can be described as follows. Consider Figure 3 where the Y-axis measures annual household income and the X-axis measures the weeks of work and leisure. The segment OA represents the maximum time available for work—fifty-two weeks in the year. The segment AN represents income not related to paid work, such as gifts, transfers from family members or other sources unrelated to the labor supply of the household. Assuming a constant wage rate, earnings from work are represented by the budget line BN. Using indifference curve analysis, the household maximizes its utility at point S′ working OL′ weeks, earning OY′ with a leisure time AL′.

**Figure 3. Impact of an Income Transfer on Labor Supply**



If the household becomes a recipient of an income transfer from a safety net program, then nonemployment income increases to N′ and the new budget line becomes B′N′. This parallel shift in the budget line generates a new optimum point for labor supply, S" which may result in a higher or lower amount of household work depending on the shape of the household's utility function. In this case the point S" shows a net increase in labor supply, where the household earns OY" from wages and works OL" weeks.

The hypothetical results in Figure 3 show that the end result of an income transfer depends on the wage and income elasticities of a beneficiary household. The net result in terms of a net change in a household's labor supply becomes an empirical question. *A formal mathematical model of the income-leisure choice faced by households is presented in Technical Appendix A.*

Figure 3 above illustrates how it is possible for a poor household to reduce its labor supply under safety net assistance. In a country with a very high proportion of poor people, the net impact of the reduction in the supply of labor could have large negative effects on the economy; this is the key issue addressed by this analysis. To calculate the net effect of an income transfer it is necessary to estimate the following:

a. What variables determine the wage rate received by household members
b. What variables determine the amount of work supplied by household members, including those variables which act through the wage rate
c. What are the wage and income elasticities of labor supply of household members

The above information is used to simulate the change in income brought about by the benefits of the social safety net, while the elasticities determine the new point of tangency between the household's new budget line and their indifference curve, as shown previously. As part of the preparation of the poverty profile for Nicaragua, the World Bank developed a profile of the labor force and estimates of the determinants of wages and labor supply. These econometric estimates for wages and labor supply are used as points of departure for the calculation of the required elasticities.

### A. The Determinants of Labor Supply [13]

Data from the 1998 Living Standards Measurement Survey indicates that labor force participation rates for rural males are about 80 percent regardless of poverty levels. However, in urban areas 73 percent of extremely poor males are in the labor force versus 67 percent of nonpoor males. On the other hand, only 24 percent of extremely poor rural women are in the labor force versus 31 percent of nonpoor women. In urban areas about 41 percent of poor and nonpoor women are in the labor force.

Among those who are in the labor force, close to 30 percent of rural males are underemployed—that is, they would like to work full time but do not have enough work, while the rate of underemployment is about 20 percent for urban males. Among working women the rate of underemployment is about 35 percent among extremely poor rural women and about 50 percent among extremely poor urban ones. Wages are highly related to the poverty level (Table 7).

[13] All the labor statistics reported in this section are taken from: Nadeem Ilahi, "Labor Markets and Poverty Reduction in Nicaragua: Evidence from the 1998 LSMS." Chapter for *The Nicaragua Poverty Assessment, 1999* (Forthcoming) (Washington, D.C.: World Bank, 2000). However, the wage elasticities and the resulting impact simulations on labor supply are calculated by the author.

The hourly wage for the extreme poor in rural areas is 35 percent of the hourly wage of the nonpoor, while in urban areas this rate is even lower: 31 percent. The average hourly wage in rural areas is C$5.1/hour (approx. US$0.40/hour) and C$9.41/hour (approx. US$0.75/hour) in urban areas. However, the gender wage differential in urban areas is significantly higher than in rural areas; males in urban areas earn about 32 percent per hour more than females, while in rural areas the difference is negligible.

**Table 7. Wages by location, poverty level and gender, 1998 (in C$/hour)**

| | Rural | | | Urban | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| **Poverty Level** | **Male** | **Female** | **Total** | **Male** | **Female** | **Total** | **Male** | **Female** | **Total** |
| Extreme poor | 2.68 | 2.27 | 2.59 | 3.52 | 3.26 | 3.42 | 2.91 | 2.72 | 2.86 |
| Poor | 3.56 | 3.70 | 3.59 | 5.37 | 4.32 | 4.94 | 4.19 | 4.04 | 4.14 |
| Nonpoor | 7.60 | 6.73 | 7.34 | 12.88 | 8.35 | 10.99 | 11.31 | 8.03 | 10.05 |
| Total | 5.10 | 5.09 | 5.10 | 10.90 | 7.32 | 9.41 | 8.30 | 6.69 | 7.73 |

Source: Nadeem Ilahi, op. cit., Table 8.1

In terms of work hours per week, there are no marked differences by gender, but there are some differences by location and poverty levels. In general, poor urban males work more than rural ones, while poor rural females work more than their urban counterparts. In total, males work more than forty-nine hours per week and women forty-six hours.

**Table 8. Hours of Work per Week By Location, Poverty Level and Gender, 1998**

| | Rural | | | Urban | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| **Poverty Level** | **Male** | **Female** | **Total** | **Male** | **Female** | **Total** | **Male** | **Female** | **Total** |
| Extreme poor | 46.0 | 46.6 | 46.1 | 50.7 | 41.4 | 47.2 | 46.9 | 44.5 | 46.3 |
| Poor | 47.8 | 45.6 | 47.3 | 50.8 | 44.0 | 48.0 | 48.6 | 44.8 | 47.5 |
| Nonpoor | 50.2 | 42.8 | 48.2 | 49.7 | 47.7 | 48.9 | 49.9 | 46.7 | 48.7 |
| Total | 48.6 | 44.3 | 47.6 | 50.0 | 46.8 | 48.6 | 49.3 | 46.0 | 48.2 |

Source: Nadeem Ilahi, op. cit., Table 7.1

### B. Estimating the Impact of the Social Safety Net on Labor Supply

Since most households in extreme poverty have zero nonemployment income, the impact of the income transfer from the social safety net can be simulated through an increase in the real wage rate. The calculation of the required wage elasticity is based on the econometric estimates of labor supply by Ilahi[14] in which the supply of labor by a household (in hours of work per day) is determined by the wage rate, its vector of socioeconomic characteristics (including proxies for wealth), and their geographic location. The required labor supply equation for adults estimated by Ilahi is shown in Appendix B, Table B1, and the labor supply equation for children is in Appendix B, Table B2.

**Table 9. Wage Elasticities for Adults and Children**

| | **Wage elasticity** |
|---|---|
| Adult males (15–60) | -0.0002 |
| Adult females (15–60) | -0.000424 |
| Male Children (10–14) | -0.000599 |
| Female Children (10–14) | -0.002821 |

[14] Ilahi , op. cit.

The elasticities are consistent with the labor supply behavior expected of a typical Nicaraguan household. Adult males have a very inelastic supply of labor with respect to wages. If wages go up by 10 percent, then their daily labor supply would be reduced by 0.02 percent. Adult females have a slightly larger response to a wage increase. A 10 percent in wages for women would reduce their daily hours of work by 0.04 percent. Male children show the next higher elasticity; a 10 percent wage increase would result in a reduction of 0.006 percent in the hours of work per day. For female children a 10 percent wage increase would reduce their daily hours of work by 0.03 percent.

Participation in the social safety net is equivalent to a wage rate increase ranging from 17.5 percent in the case of nutritional assistance which entails an income transfer of US$31, to 41 percent in the case of an income transfer of US$74 for those households receiving full benefits. As a consequence, the potential impact on the labor supply of the household is:

**Table 10. Maximum Potential Reduction in Household Labor among Extremely Poor Families**

| | Total Potential Reduction in Labor Supply (work days) | |
|---|---|---|
| | **17%** | **41%** |
| Adult Males | 0.09 | 0.20 |
| Adult Females | 0.18 | 0.43 |
| Male Children | 0.26 | 0.60 |
| Female Children | 1.21 | 2.83 |
| Total Days per Household/Year | 1.74 | 4.06 |

The results indicate that the impact of the social safety net on the labor supply of extremely poor households would be very small. This finding is consistent with a low wage elasticity for workers in extreme poverty. If household consumption is below subsistence levels, an increase in disposable income that takes the household to the extreme poverty line is not enough to produce a slack in the work effort. A very low wage elasticity for people in extreme poverty makes sense, since survival is at stake; workers in the household would take any work they can get at any salary. The results also are consistent with the cases of household members out of the labor force, since there is no labor supply to be reduced or increased. However, the model does not capture the effect on discouraged workers—those who are out of the labor force because of long period of unemployment. However, the results from the LSMS indicate that the proportion of workers in this category is small.

On average, households that receive only nutritional assistance would reduce their yearly amount of work by a little less than two days, while households that receive the full benefits of the net would reduce their labor supply by approximately four days. As expected, children, especially females, would reduce their labor supply the most, which is one of the social objectives sought by the social safety net. The above results are also consistent with the figures in Table 8, which show very little difference in the amount of work by poverty level, even though the nonpoor have an income level that is much higher than the 41 percent increase implicit in a full transfer from the social safety net.

## V. Conclusions

The objective of this paper was to determine the potential impacts of a social safety net on fiscal balances, tax revenues and labor supply. In this regard, the paper addressed three questions:

*Are social safety nets fiscally sustainable?* The results indicate that the sustainability of a social safety net depends on large part to the rationalization of existing poverty alleviation programs, some of which could

be targeted better, and some of which could be reformulated to make them more oriented toward the extreme poor. As a result, if 25 percent of the current poverty alleviation portfolio was reallocated to the type of transfer programs being piloted by the social safety net, then the deficit would increase from $235 million to $278 million. If 50 percent of the current poverty alleviation portfolio was reallocated to the net, then the deficit would increase from $235 million to $264 million. Under the latter assumption, the deficit would increase from 28 percent of the national budget to 30 percent—or a modest increase of two percentage points.

*Are social safety nets complementary to tax policy in improving the distribution of incomes?* The results indicate that to cover the cost of a safety net that would attend the expenditure gap of the *extremely* poor (approximately 150,000 households) the government would have to increase tax *revenues* from petroleum taxes and the value added tax by 5 percent. This revenue increase may or may not require an increase in the tax rate, since improved collection may be enough. Other tax sources are too small to make an impact, or have already undergone significant modifications.

*Are social safety nets good for economic growth?* It has been argued that the income transfers from a social safety net may yield a net disincentive to work among poor households. The results indicate that the size of the disincentive is very small, not exceeding four days per year. Moreover, most of the reduction would accrue to child labor, which is one of the key social objectives of the social safety net, and which is socially desirable for the accumulation of human capital among the poor.

## Technical Appendix A

### *A Household's Income-Leisure Choice*

A more formal treatment of the income-leisure choice is shown in mathematical form. A household is assumed to maximize a utility function with arguments income and leisure time:[15]

$$\text{Max } u(t,x) \qquad (1)$$

Subject to a budget constraint:

$$t = w(k-x) + y \qquad (2)$$

where t is total income, x is leisure time, w is the wage rate, k is the total time available for work and leisure, and y is nonemployment income. The appropriate Lagrangian is:

$$L = u(t,x) - \ddot{e}(t+xw - kw - y) \qquad (3).$$

First order conditions for a maximum are:

$$\ddot{a}u/\ddot{a}t - \ddot{e} = 0 \qquad (4)$$

$$\ddot{a}u/\ddot{a}x - \ddot{e}w = 0 \qquad (5)$$

$$t + wx - wk - y = 0 \qquad (6)$$

Letting $\ddot{a}u/\ddot{a}t = U_t$ and $\ddot{a}u/\ddot{a}x = U_x$, (4) and (5) can be rewritten as:

$$U_t = \ddot{e} \qquad (7)$$

$$U_x = \ddot{e}w. \qquad (8)$$

The marginal rate of substitution of income for leisure is the wage rate[16]:

$$Ux/Ut = w \qquad (9)$$

Now it is possible to obtain the effects of a change in nonemployment income on the supply of labor. Taking the total derivative of (4), (5) and (6):

$$\ddot{a}^2u/\ddot{a}t^2\, dt + \ddot{a}^2u/\ddot{a}t\ddot{a}x\, dx - d\ddot{e} = 0 \qquad (10)$$

$$\ddot{a}^2u/\ddot{a}x\ddot{a}t\, dt + \ddot{a}^2u/\ddot{a}x^2\, dx - (\ddot{e}dw + wd\ddot{e}) = 0 \qquad (11)$$

$$dt + xdw + wdx - kdw - dy = 0 \qquad (12)$$

---

[15] The model presented here is an adaptation of Marvin Kosters, *Income and Substitution Effects in a Family Labor Supply Model*, Monograph P-3339 (Santa Monica, CA: The Rand Corporation, 1966). For a basic treatment of the income-leisure choice see James Henderson and Richard E. Quandt, *Microeconomic Theory: A Mathematical Approach*, 2nd ed. (New York: McGraw Hill, 1971).

[16] For ease of exposition the second order conditions are assumed to hold true.

Letting $\partial^2 u/\partial t^2 = U_{tt}$; $\partial^2 u/\partial t \partial x = U_{tx}$; $\partial^2 u/\partial x^2 = U_{xx}$; and $\partial^2 u/\partial x \partial t = U_{xt}$ and substituting into (10), (11), and (12):

$$U_{tt}dt + U_{tx}dx - d\lambda = 0 \qquad (13)$$

$$U_{xt}dt + U_{xx}dx - w\, d\lambda = \lambda dw \qquad (14)$$

$$dt + wdx = dy - xdw + kdw \qquad (15)$$

Rearranging (15):

$$dt + wdx = (k-w)dw + dy$$

In matrix form—and after significant manipulation—this system of equations can be resolved for the change in leisure that would result from a change in nonemployment income, such as in the case of participation in a safety net program:

$$\partial x/\partial y = \frac{\begin{bmatrix} Utt & 0 & Ut \\ Uxt & 0 & Ux \\ Ut & \lambda & 0 \end{bmatrix}}{\begin{bmatrix} Utt & Utx & Ut \\ Uxt & Uxx & Ux \\ Ut & Ux & 0 \end{bmatrix}} = \frac{-\lambda(UttUx - UxtUt}{\begin{bmatrix} Utt & Utx & Ut \\ Uxt & Uxx & Ux \\ Ut & Ux & 0 \end{bmatrix}} \qquad (16)$$

Letting de cofactor of U.. be D..; the cofactor of U. be D.; and the denominator be D, then

$$-(UttUx - UxtUt) = Dx \qquad (17)$$

which means that

$$\partial x/\partial y = \lambda Dx/D \qquad (18)$$

and

$$\partial t/\partial y = \lambda Dt/D \qquad (19).$$

Similarly,

$$\partial x/\partial w = \lambda\, Dxx/D + \lambda\, (k-x)\, (Dx/D) \qquad (20).$$

Equation (20) is of interest because—substituting from (18)—it becomes the Slutsky equation, which shows that in any shift in the budget line, there is an income and a substitution effect:

$$\partial x/\partial w = \lambda\, Dxx/D + (k-x)\, \partial x/\partial y \qquad (21)$$

The second component in (21) is the *income effect*, which shows the change in leisure time due to change in nonemployment income, with the total weeks of work as a weighting factor. Clearly, if income from

wage work represents most of the total income, the smaller äx/äy will be. If leisure is a normal good, then the income effect should be positive. That is, an increase in nonemployment income should bring about an increase in household leisure. The substitution effect is negative because Dxx is negative. As a result, the net sign of äx/äw has to be obtained empirically.

The Slutsky equation can be expressed in terms of income and wage elasticities. Denoting ë Dxx/D as $äx^s/äw$, the (21) becomes

$$äx/äw = äx^s/äw + (k-x)\ äx/äy \qquad (22).$$

Multiplying (22) through by w/x and the last term by y/y one obtains

$$äx/äw\ w/x = äx^s/äw\ w/x + (k-x)\ äx/äy\ w/x\ y/y \qquad (23)$$

which in notation for elasticities is equal to:

$$ç_w = ç^s_w + ç_w\ (k-x)w/ç_y \qquad (24)$$

where $ç_w$ is the elasticity of demand for leisure with respect to the wage rate, $ç^s_w$ is the income compensated wage elasticity and $ç_y$ is the income elasticity of demand. The *elasticities for leisure are the negative of the elasticities for work* since the sum of leisure and employment cannot exceed fifty-two weeks. Hence, a labor supply equation would yield the negative elasticity for leisure, which are the essential parameters for the simulation analysis. Defining L = (k-x) as the number of weeks of work, then (24) may be interpreted in terms of weeks of labor supplied as

$$å_w = å^s_w + WL/y\ å_y \qquad (25)$$

where $å_w$ is the labor supply elasticity with respect to the wage rate, $å^s_w$ is the income compensated supply elasticity with respect to wages, and is the labor supply elasticity with respect to nonemployment income. The values for $å_w$ and $å_y$ can be empirically estimated and $å^s_w$ can be calculated by the difference:

$$å^s_w = å_w - WL^*/y\ å_y \qquad (26)$$

## Technical Appendix B

### *Labor Supply Estimation*

**Table B1. Regression of Hours/Day Spent by Adults (15–60) in All Work Activities on Wages and Other Variables**

| | All | Male | Female |
|---|---|---|---|
| Age | 0.487825** | 0.4550** | 0.5065** |
| Age squared | -0.005988** | -0.0057** | -0.0062** |
| Dummy for interview on Sunday/Monday | -0.899155** | -1.4804** | -0.3702* |
| Years of education | -0.064827** | -0.0808** | -0.0463* |
| Dummy for modern fuel | -0.446201** | -0.7905** | -0.1508 |
| Dummy for water tap | -0.312392** | -0.0468 | -0.5513** |
| Children under 6 | 0.533626** | 0.2881** | 0.7331** |
| Children 6–9 | 0.189686** | 0.1722 | 0.1909** |
| Children 10–14 | -0.159872** | -0.1314 | -0.1882** |
| Single | -1.166373** | -1.5966** | -1.0012** |
| Female headed household (new definition) | 1.396619** | -0.6775 | 1.2752** |
| Prime age females per capita in household | -0.350609 | -0.5650 | -0.3862 |
| Walls: adobe | 0.541735** | 0.3821 | 0.6654** |
| Walls: wood | 0.215372 | 0.2669 | 0.1209 |
| Floor: wood | -0.300291 | -0.2977 | -0.2740 |
| Floor: dirt | 0.35936** | 0.6656** | 0.0612 |
| Ceiling: clay | 0.091921 | 0.2385 | -0.1015 |
| Ceiling: straw | 0.166494 | 0.0223 | 0.2555 |
| Cluster wage | -0.000802 | -0.0005 | -0.0011 |
| Quintile 2 | 0.175507 | 0.2047 | 0.1167 |
| Quintile 3 | 0.280886 | 0.2327 | 0.2400 |
| Quintile 4 | 0.328588 | 0.3721 | 0.1796 |
| Quintile 5 | 0.754674** | 0.6743* | 0.7175** |
| Region: Pacific Urban | -0.613338** | -0.7077** | -0.5258** |
| Region: Pacific Rural | -0.952199** | -0.5435* | -1.3728** |
| Region: Central Urban | -0.516373** | -0.3057 | -0.7099** |
| Region: Central Rural | -0.423101** | 0.3596 | -1.3012** |
| Region: Atlantic Urban | -0.460106** | 0.3380 | -1.1390** |
| Region: Atlantic Rural | 0.040421 | 0.7188 | -0.5859 |
| Female | 0.36223** | | |
| Intercept | 0.185277 | 1.0308 | 0.3121 |
| | | | |
| No. Obs: | 5232 | 2540 | 2692 |

Source: Ilahi, 2000, op. cit., Table 13.1 *(**) indicate statistical significance at the 5 percent (10 percent) level.

| **Table B2. Regression of Hours/Day Spent by Children (10 - 14) in All Work Activities on Wages and Other Variables** | | | |
|---|---|---|---|
| | **All** | **Male** | **Female** |
| Age | 0.18972 | 0.9257 | -0.0004 |
| Age squared | 0.005067 | -0.0239 | 0.0130 |
| Dummy for interview on Sunday/Monday | 0.23886 | 0.2165 | 0.3052 |
| Education of head | -0.073272** | -0.0375 | -0.0703* |
| Dummy for modern fuel | -0.116181 | -0.8481* | 0.3615 |
| Dummy for water tap | -0.490605** | -0.3369 | -0.6718** |
| Sch_dist | 0.157606** | 0.2742** | 0.0415 |
| Children under 6 | 0.271013** | 0.2737 | 0.2317* |
| Children 6–9 | 0.051072 | 0.0989 | 0.0001 |
| Children 10–14 | -0.34164** | -0.5089** | -0.1427 |
| Female headed household (new definition) | 0.77999** | 0.9342** | 0.7356 |
| Prime age females per capita in household | -1.18573** | -1.5442** | -1.0114 |
| Walls: adobe | 0.400466 | -0.2144 | 1.0845** |
| Walls: wood | 0.044924 | 0.0634 | 0.2310 |
| Floor: wood | 0.003045 | 0.5122 | -0.2874 |
| Floor: dirt | 0.689044** | 0.7800* | 0.6218 |
| Ceiling: clay | -0.399953 | -0.8527** | -0.0674 |
| Ceiling: straw | 0.042883 | -0.5055 | 0.6334 |
| Cluster wage | -0.001062 | -0.0009 | -0.0042 |
| Quintile 2 | 0.349531 | 0.1119 | 0.5580 |
| Quintile 3 | 0.512274 | 0.3562 | 0.6102 |
| Quintile 4 | 0.651776 | 0.3228 | 0.8878 |
| Quintile 5 | -0.141231 | -0.2544 | -0.1790 |
| Region: Pacific Urban | -0.022084 | 0.2110 | -0.2796 |
| Region: Pacific Rural | 0.098309 | 0.0815 | -0.0009 |
| Region: Central Urban | 0.677316* | 1.9309** | -0.3604 |
| Region: Central Rural | 1.253412** | 2.0632** | 0.3017 |
| Region: Atlantic Urban | 0.742444 | 1.2595 | 0.1398 |
| Region: Atlantic Rural | 1.906764 | 2.0920** | 1.2214* |
| Female | 0.084105 | | |
| Intercept | 0.614628 | -3.8139 | 1.6277 |
| | | | |
| No. Obs | 910 | 428 | 482 |

Source: Ilahi, 2000, op. cit., Table 15.1 *(**) indicate statistical significance at the 5 percent (10 percent) level.